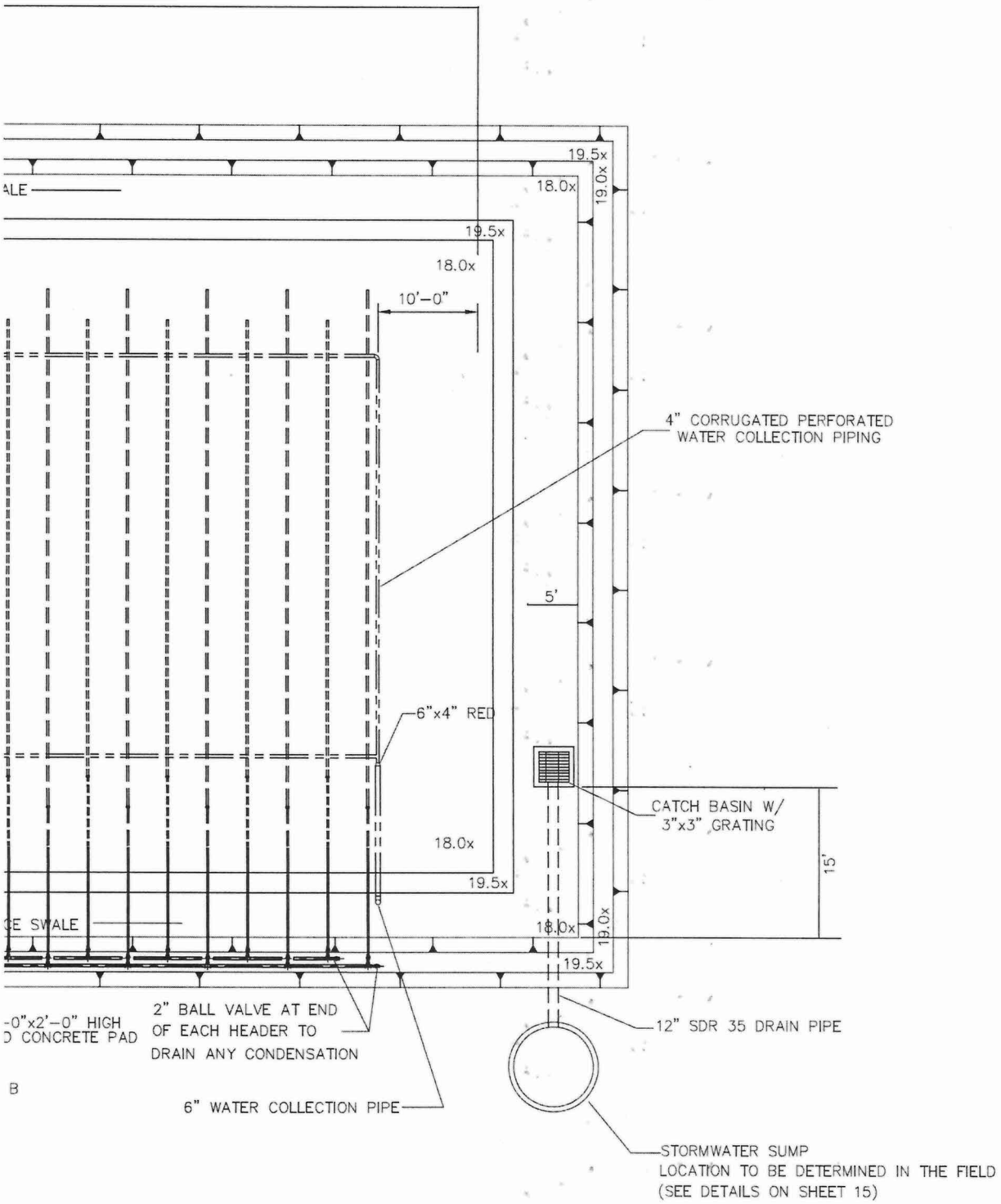
Figures



= LOWER ZONE PIPING

= UPPER ZONE PIPING

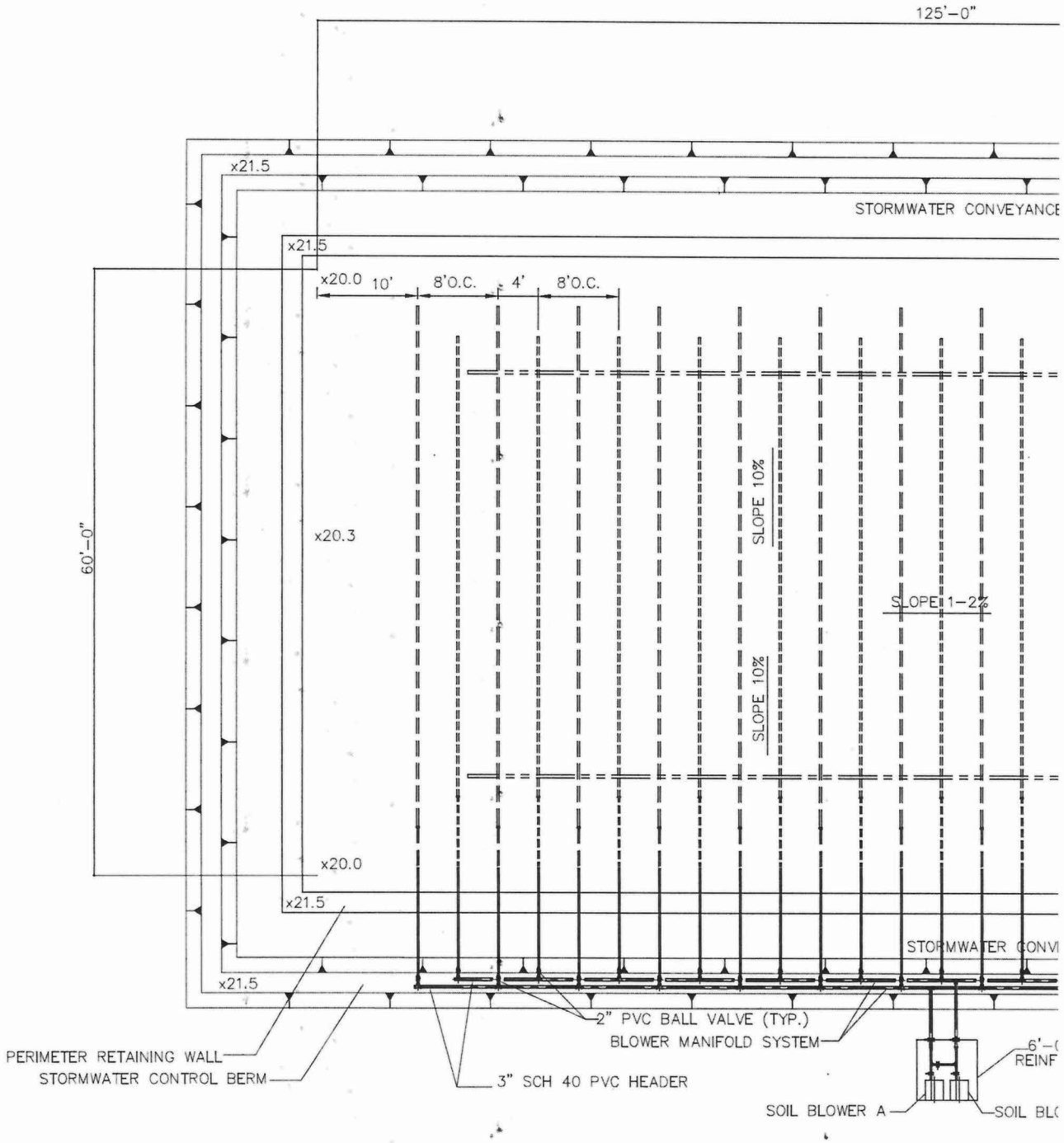
feet
30

Scale	Date
1"=15'	Feb 2009

ANDERSON - MULHOLLAND & ASSOCIATES, INC.
WHITE PLAINS, NEW YORK
SAN JUAN, PUERTO RICO

Figure 1
PLAN OF TEMPORARY UNIT

Bristol-Myers Squibb Manufacturing Company
Humacao, Puerto Rico



LEGEND:

==========

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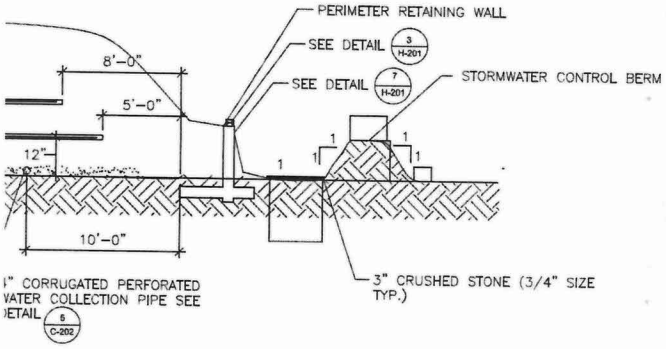
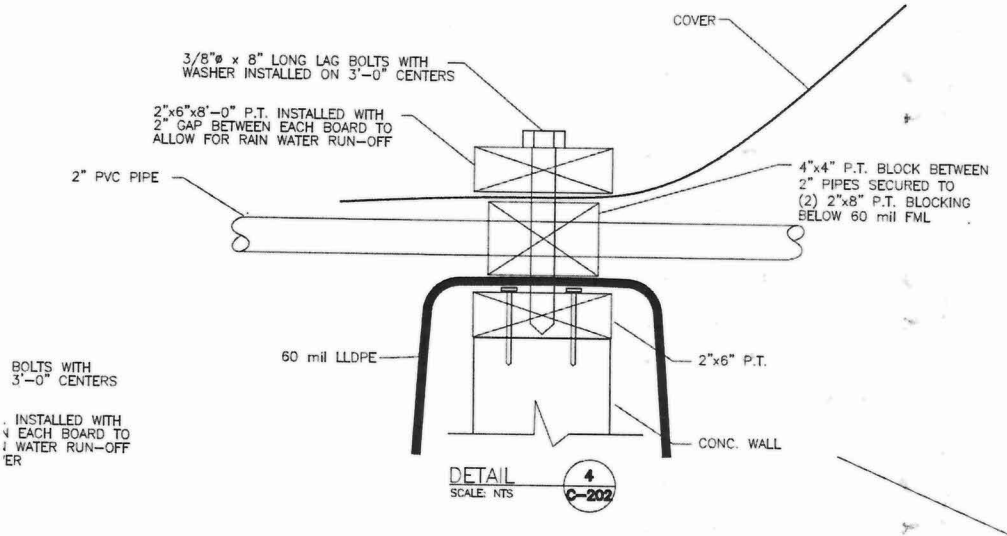
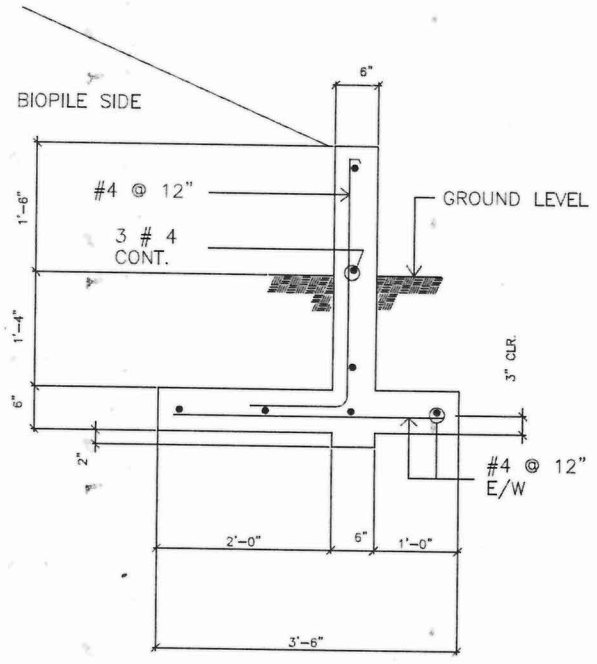
Scale

15 0





DETAIL 4 C-202
SCALE: NTS



TYPICAL SECTION
BIOPILE RETAINING WALL
7 C-202

ONE

O PIPE

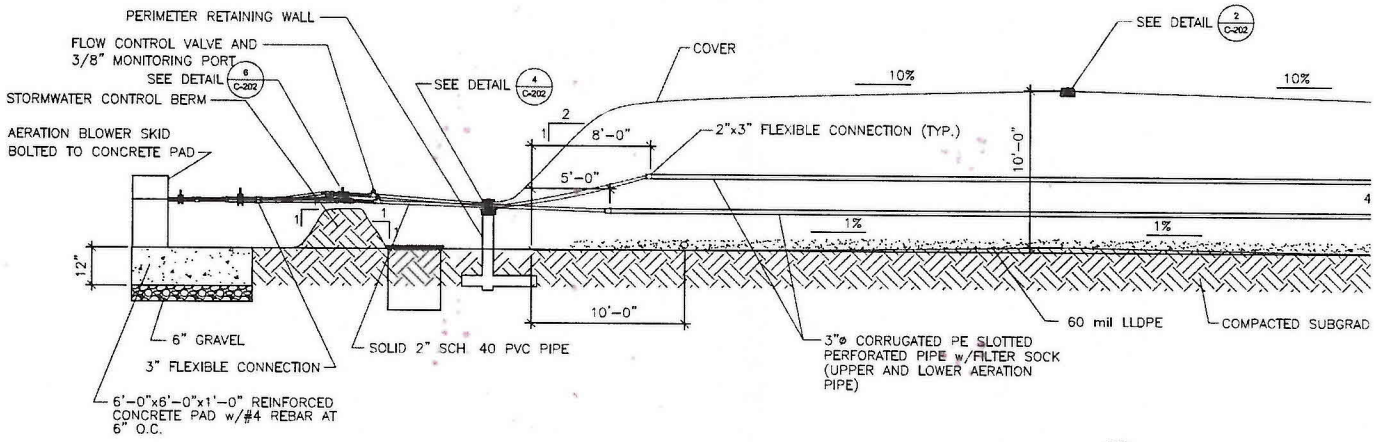
Scale	Date
None	Feb 2009

Anderson - Mulholland & Associates, Inc.
WHITE PLAINS, NEW YORK
SAN JUAN, PUERTO RICO

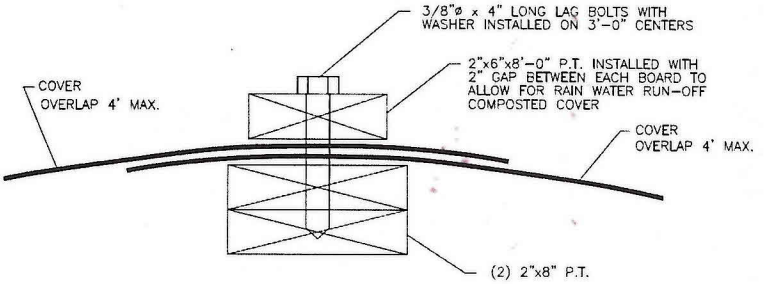
Figure 2

CROSS SECTION AND DETAILS OF TEMPORARY UNIT

Bristol-Myers Squibb Manufacturing Company
HUMACAO, PUERTO RICO



SECTION BIOPILE 1 C-101
SCALE: NTS



DETAIL 2 C-202
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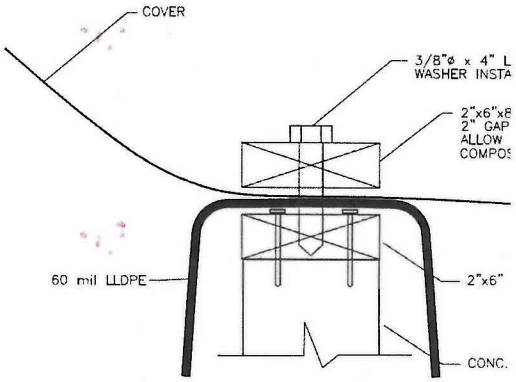
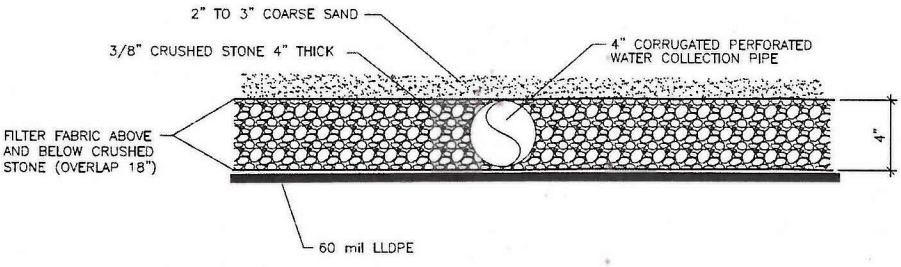


DETAIL 3 C-202
SCALE: NTS



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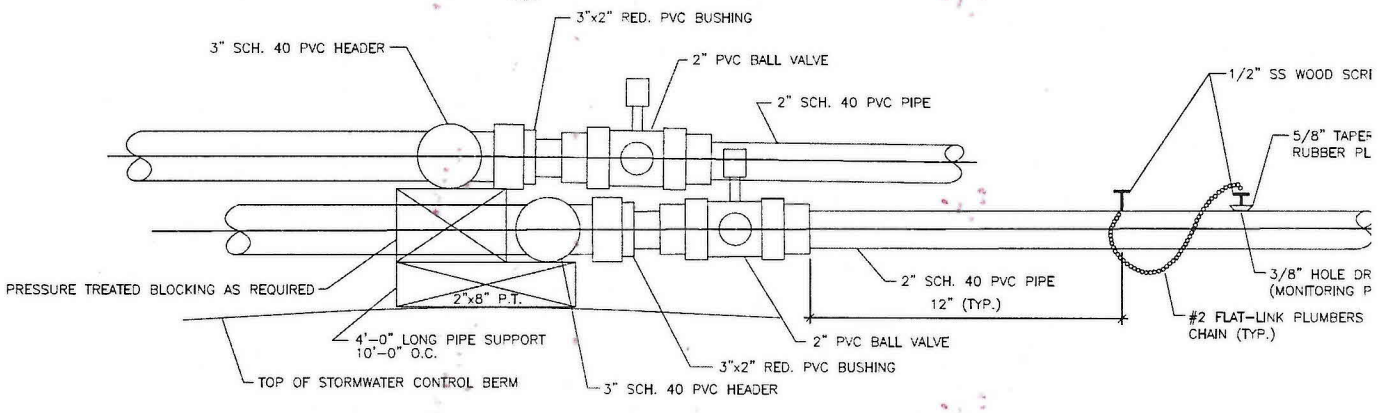
SCALE: NTS



DETAIL 6 C-202
SCALE: NTS

Attachment A
Engineering Drawings of Temporary Unit

RTO)

Anderson Mulholland & Associates

Approved by

Customer Representative	mm/dd/yy
Drafter	mm/dd/yy
Project Manager	mm/dd/yy
Engineering Manager	mm/dd/yy
Quality Assurance	mm/dd/yy

Rev	date	description	by
A			

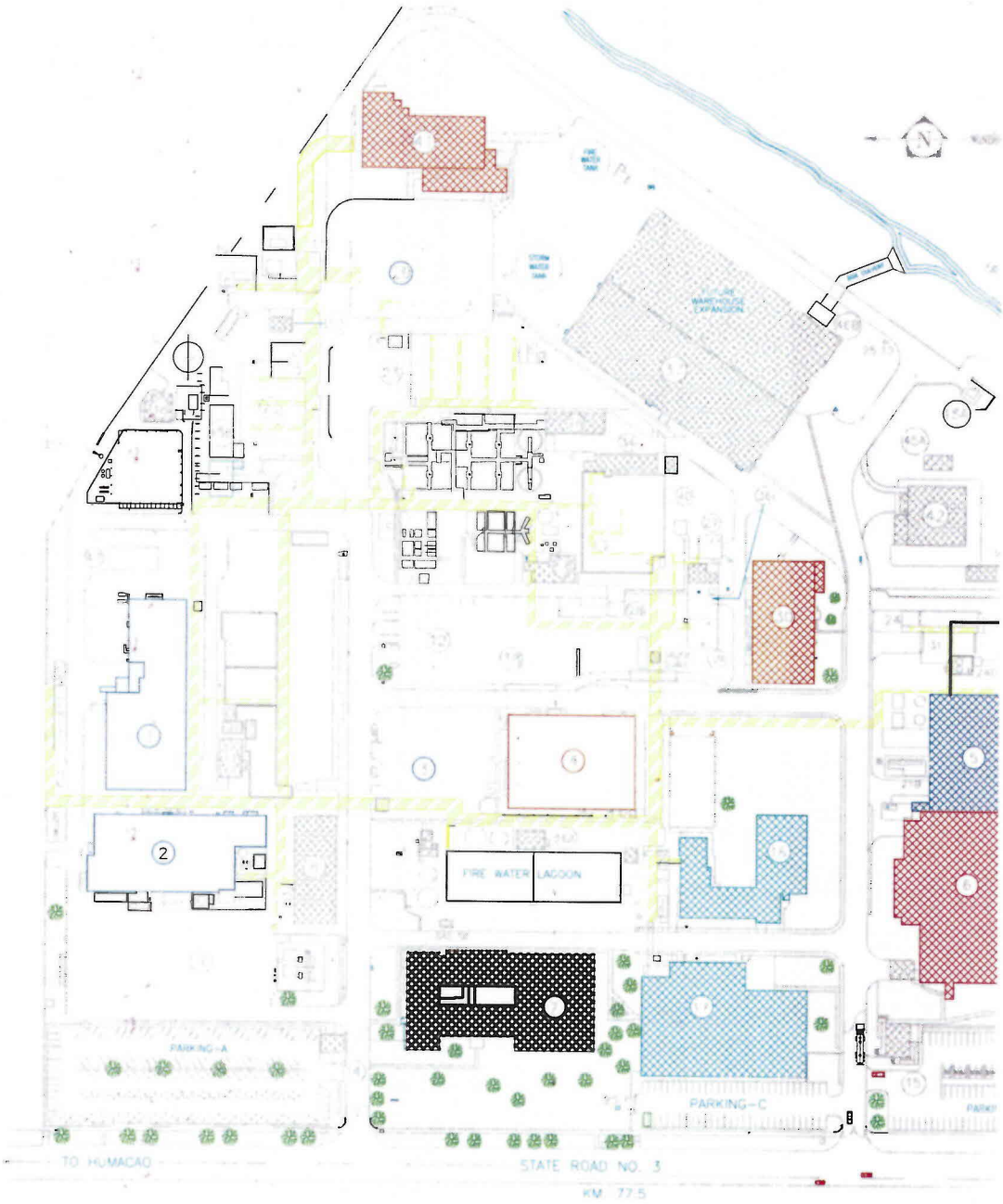
Bristol-Myers Squibb Company

title SITE PLAN

project SOIL REMOVAL AND REMEDIATION

location:

DATE: 04/10/12	SHEET #: G-101
SCALE:	CAD FILE NAME
PRJ MGR:	
DESIGNER:	
VENDOR NAME:	
VENDOR PROJECT NUMBER:	
AUTHOR:	
DISCIPLINE:	
SYSTEM:	
SYSTEM #:	
EQUIPMENT:	



LEGEND

1–FORMER PROCESS BLDG.

2–FORMER PROCESS BLDG.

3–FORMER PROCESS BLDG.

4–FORMER PHARMACEUTICAL BLDG.

5–BULK PROCESS BLDG.

6–PHARMACEUTICAL BLDG.
SOLID DOSAGE FORMS

7–ADMINISTRATION BLDG.

8–UTILITIES BLDG.

9–FORMER WAREHOUSE & TRAINING ROOM

10–DRUM STORAGE BLDG.

11–SOLV. REC. CONTROL BLDG.

12–FORMER SPARE PARTS WAREHOUSE BLDG.

13–WASTE TREATMENT LAB. BLDG.

14–WEST GUARD HOUSE

15–EAST GUARD HOUSE

15A–NORTH GUARD HOUSE

16A–FIRE WATER PUMP HOUSE

16B–FIRE WATER PUMP TANK

17–QUALITY CONTROL BLDG.

18–T.O.D. & PILOT PLANT LAB.

19–TEMPORARY LAB. FACILITIES

20–FIRE WATER LAGOONS

21–ELECTRICAL SUB–STATIONS
A–38 KVA. MAIN SUB–STATION
A'–BLDG. NO. 29
B–BLDG. NO. 5
C–WASTE TREATMENT
D–Q.C. & LLVE. BLDG.
E–SALTY WASTE INCINERATOR
F–BLDG. NO. 1
G–C.T. & CHILLER AREA

23–FORMER SOLVENT TANK FARM

24–FORMER TANK FARM DIKES

25–WATER WELLS
25.6–DRUM STORAGE
25.7–BLDG. NO. 7
25.8–BLDG. NO. 6
25.10–BLDG. NO. 9
25.12–NORTH EAST PLANT

26–DEWATERING BLDG.

27–FORMER CALORIC–I INCINERATOR

28–

29–FORMER PROCESS BLDG.

30–ENG. & MAINT. OFFICE

31–SPILL COLLECTION SYSTEM

32–COOLING TOWERS

34–DRUM MANAGEMENT FAC.

36–TRANE INCINERATOR

37–WAREHOUSE BLDG.

38–FORMER ENG. & MAINT. SHOP/OFFICE

39–FORMER CALORIC–II INCINERATOR

40–FORMER SOLID INCINERATOR

41–PHARMACEUTICAL BLDG.
SOLID DOSAGE FORMS

42–DRUM STORAGE FACILITIES

43–RECYCLING COLLECTION BUILDING

45A–EAST SIDE COOLING TOWERS

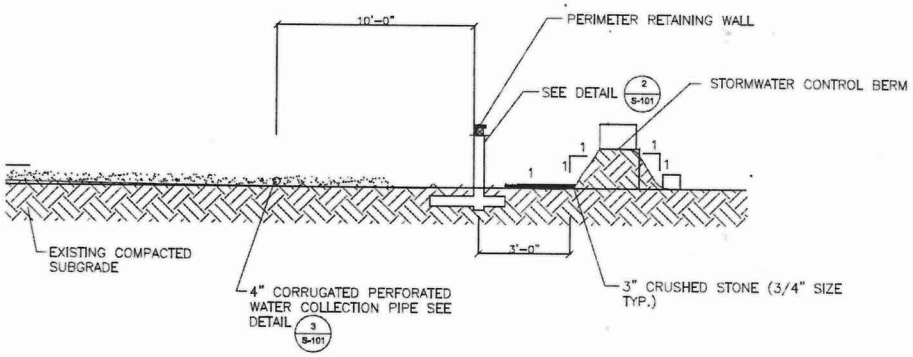
45B–WEST SIDE COOLING TOWERS

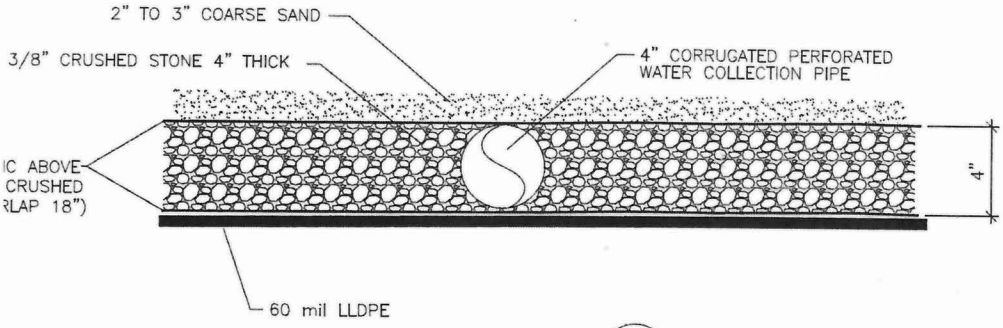
46A–SANITARY SEWER MONITORING STA

46B–STORM SEWER PUMPING/MONITOR

47–FORMER REGENERATIVE THERMAL

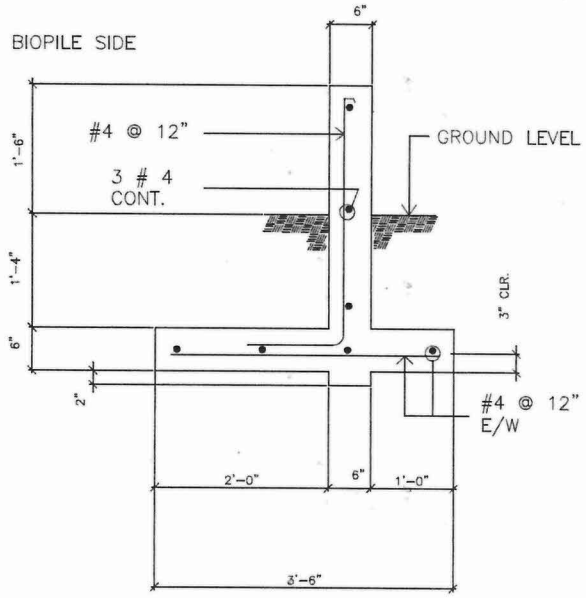
48–FORMER THERMAL OXIDIZER UNITS





DETAIL 3 / S-101
SCALE: NTS

IMETER
AINING
L
60'-0"



TYPICAL SECTION
BIOPILE RETAINING WALL 2 / S-101

Anderson Mulholland & Associates

Approved by

Customer Representative	mm/dd/yy
Drafter	mm/dd/yy
Project Manager	mm/dd/yy
Engineering Manager	mm/dd/yy
Quality Assurance	mm/dd/yy

Rev. A	date	description	by
1	10/30/08	ADD BIOPILE RETAINING WALL	GL

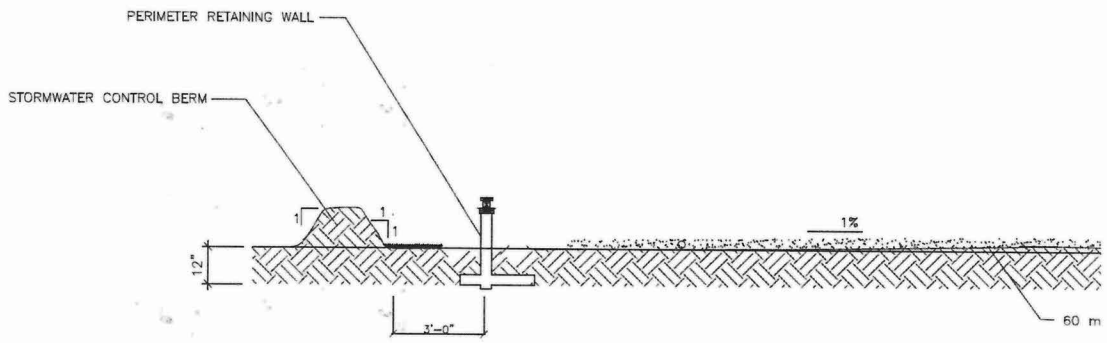
Bristol-Myers Squibb Company

title: STRUCTURAL PLAN AND DETAILS

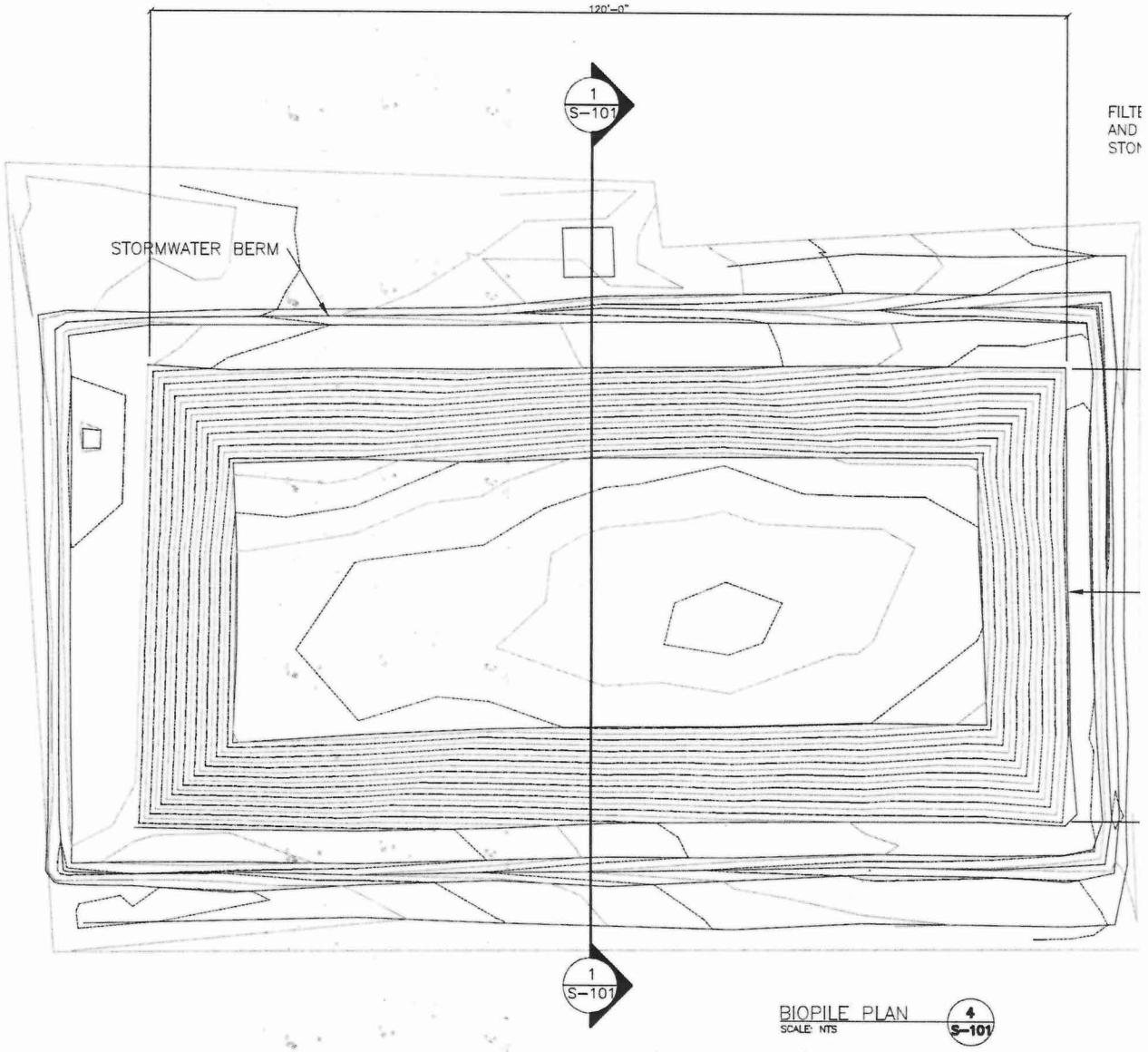
project: SOIL REMOVAL AND REMEDIATION

location:

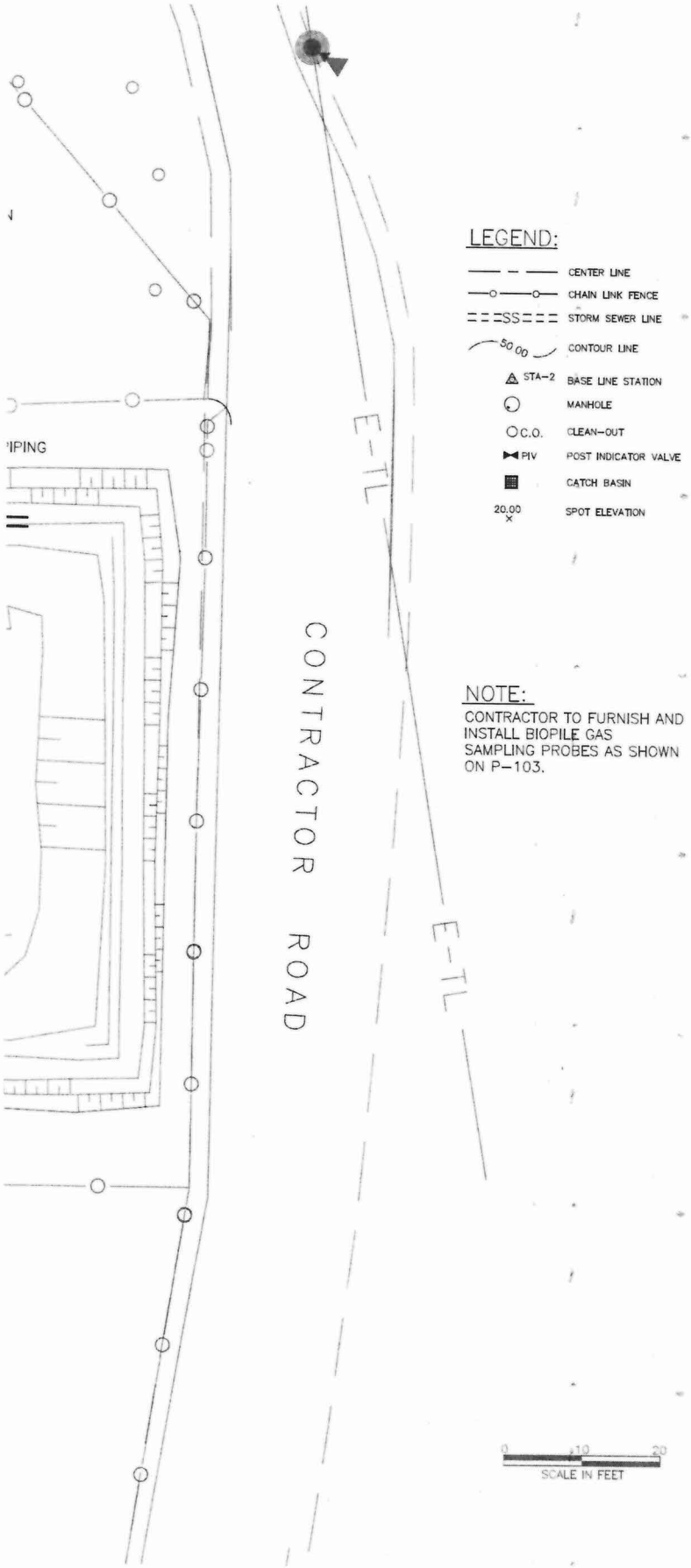
DATE: 04/10/12	SHEET #: S-101
SCALE:	
PRJ MGR:	CAD FILE NAME
DESIGNER:	
VENDOR NAME:	
VENDOR PROJECT NUMBER:	
AUTHOR:	
DISCIPLINE:	
SYSTEM:	
SYSTEM #:	
EQUIPMENT:	



SECTION BIOPILE 1 / S-101
SCALE: NTS



BIOPILE PLAN 4 / S-101
SCALE: NTS



LEGEND:

- CENTER LINE
- CHAIN LINK FENCE
- SS STORM SEWER LINE
- 50.00 CONTOUR LINE
- STA-2 BASE LINE STATION
- MANHOLE
- C.O. CLEAN-OUT
- PIV POST INDICATOR VALVE
- CATCH BASIN
- 20.00 SPOT ELEVATION

NOTE:

CONTRACTOR TO FURNISH AND INSTALL BIOPILE GAS SAMPLING PROBES AS SHOWN ON P-103.

0 10 20
SCALE IN FEET

Anderson Mulholland & Associates

Approved by

Customer Representative	mm/dd/yy
Drafter	mm/dd/yy
Project Manager	mm/dd/yy
Engineering Manager	mm/dd/yy
Quality Assurance	mm/dd/yy

Rev	date	description	by
A			

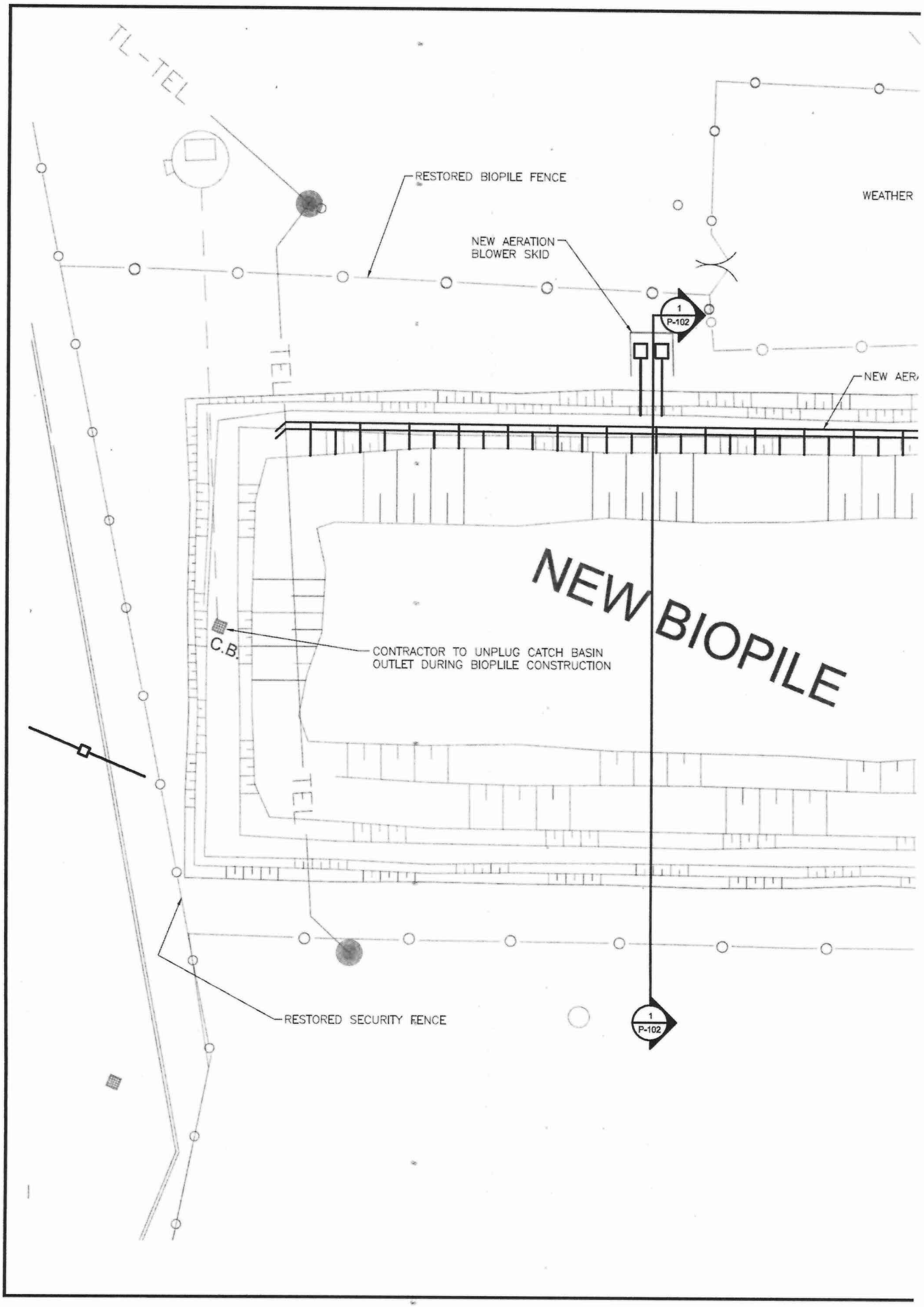
Bristol-Myers Squibb Company

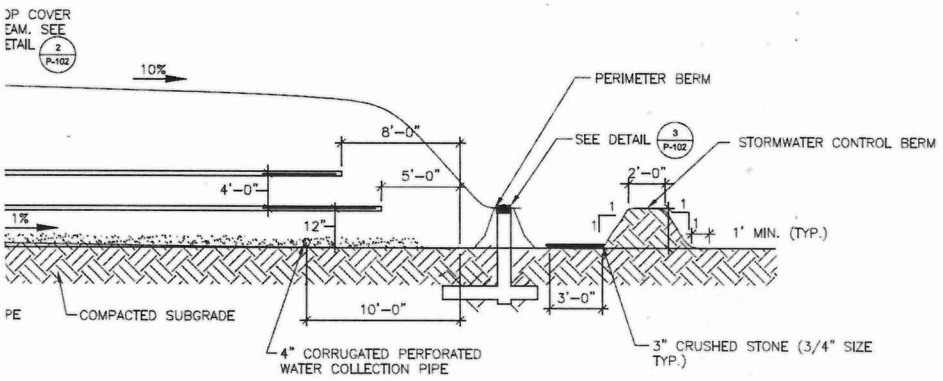
title: BIOPILE PLAN

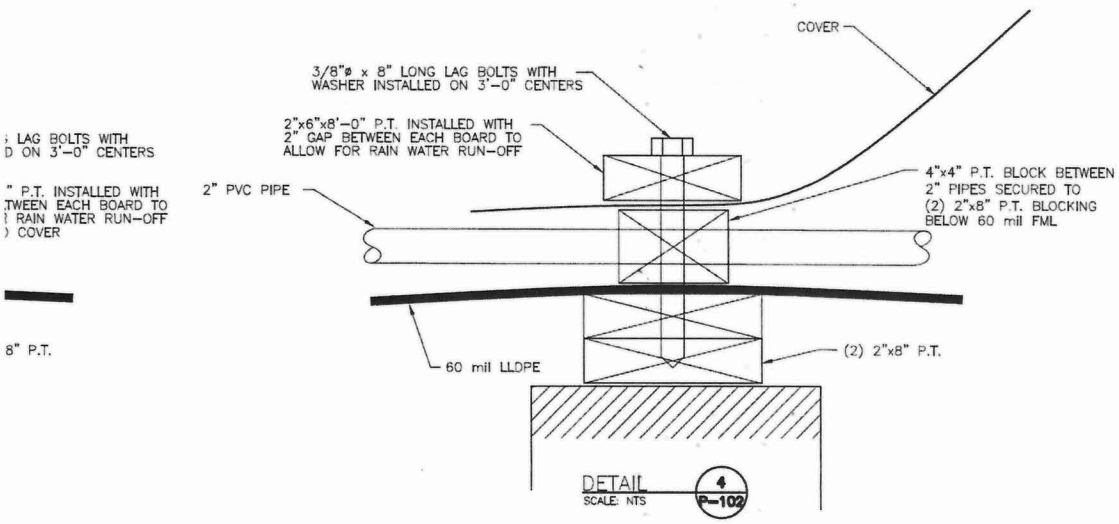
project: SOIL REMOVAL AND REMEDIATION

location:

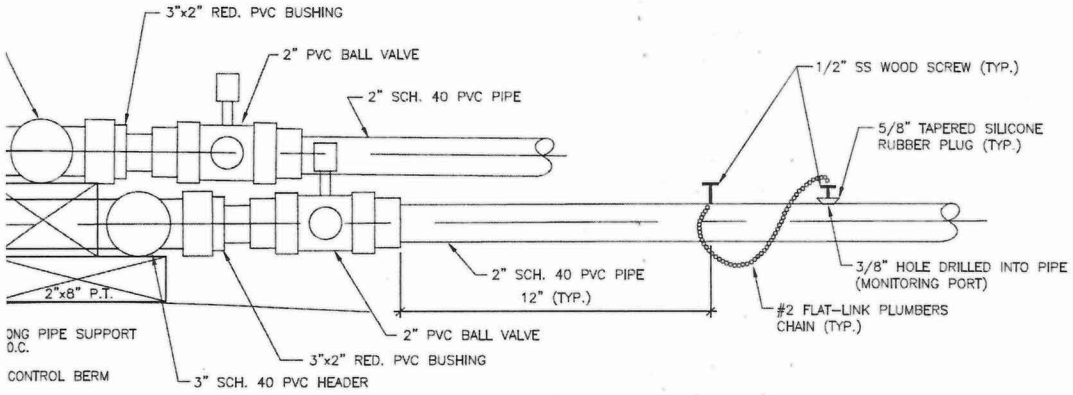
DATE: 04/10/12	SHEET #: P-101
SCALE:	
PRJ MGR:	CAD FILE NAME
DESIGNER:	
VENDOR NAME:	
VENDOR PROJECT NUMBER:	
AUTHOR:	
DISCIPLINE:	
SYSTEM:	
SYSTEM #:	
EQUIPMENT:	


TL-TEL
RESTORED BIOPILE FENCE
NEW AERATION
BLOWER SKID
WEATHER
1
P-102
TEL
NEW AER
NEW BIOPILE
C.B.
CONTRACTOR TO UNPLUG CATCH BASIN
OUTLET DURING BIOPLILE CONSTRUCTION
TEL
RESTORED SECURITY FENCE
1
P-102





DETAIL 4
SCALE: NTS P-102



DETAIL 5
SCALE: NTS P-102

Anderson Mulholland & Associates

Approved by

Customer Representative	mm/dd/yy
Drafter	mm/dd/yy
Project Manager	mm/dd/yy
Engineering Manager	mm/dd/yy
Quality Assurance	mm/dd/yy

Rev #	date	description	by

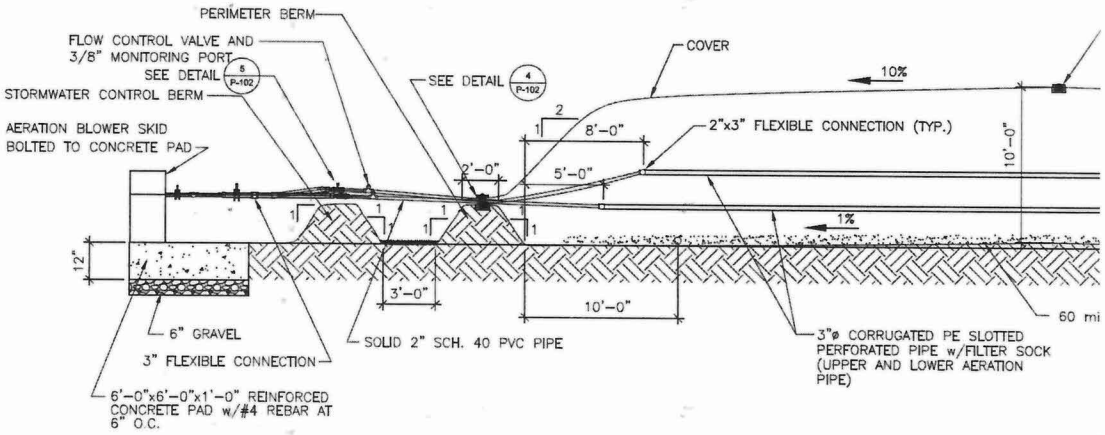
Bristol-Myers Squibb Company

title: **BIOPILE SECTION AND DETAILS**

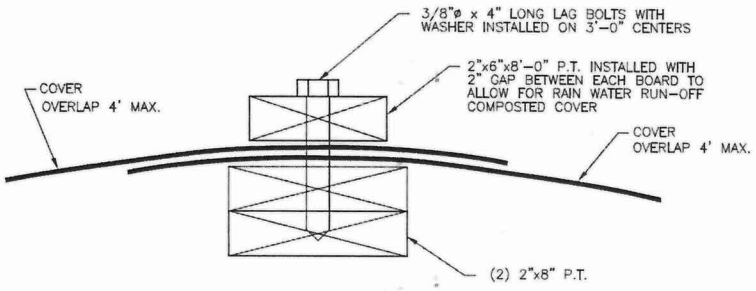
project: **SOIL REMOVAL AND REMEDIATION**

location:

DATE: 04/10/12	SHEET #: P-102
SCALE:	CAD FILE NAME
PRJ MGR:	
DESIGNER:	
VENDOR NAME:	
VENDOR PROJECT NUMBER:	
AUTHOR:	
DISCIPLINE:	
SYSTEM:	
SYSTEM #:	
EQUIPMENT:	



SECTION BIOPILE
SCALE: NTS



DETAIL 2 P-102
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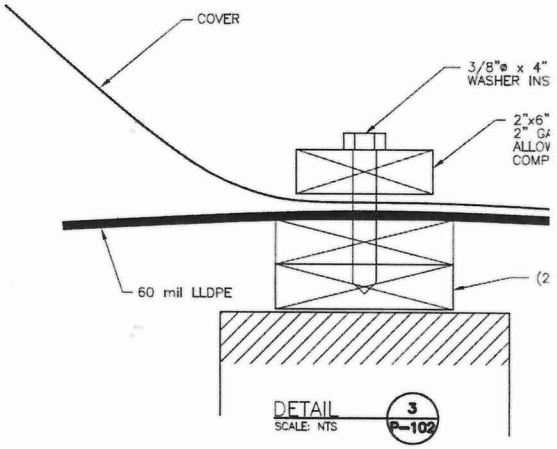
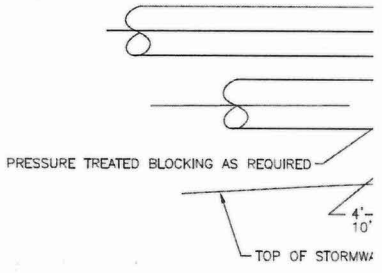
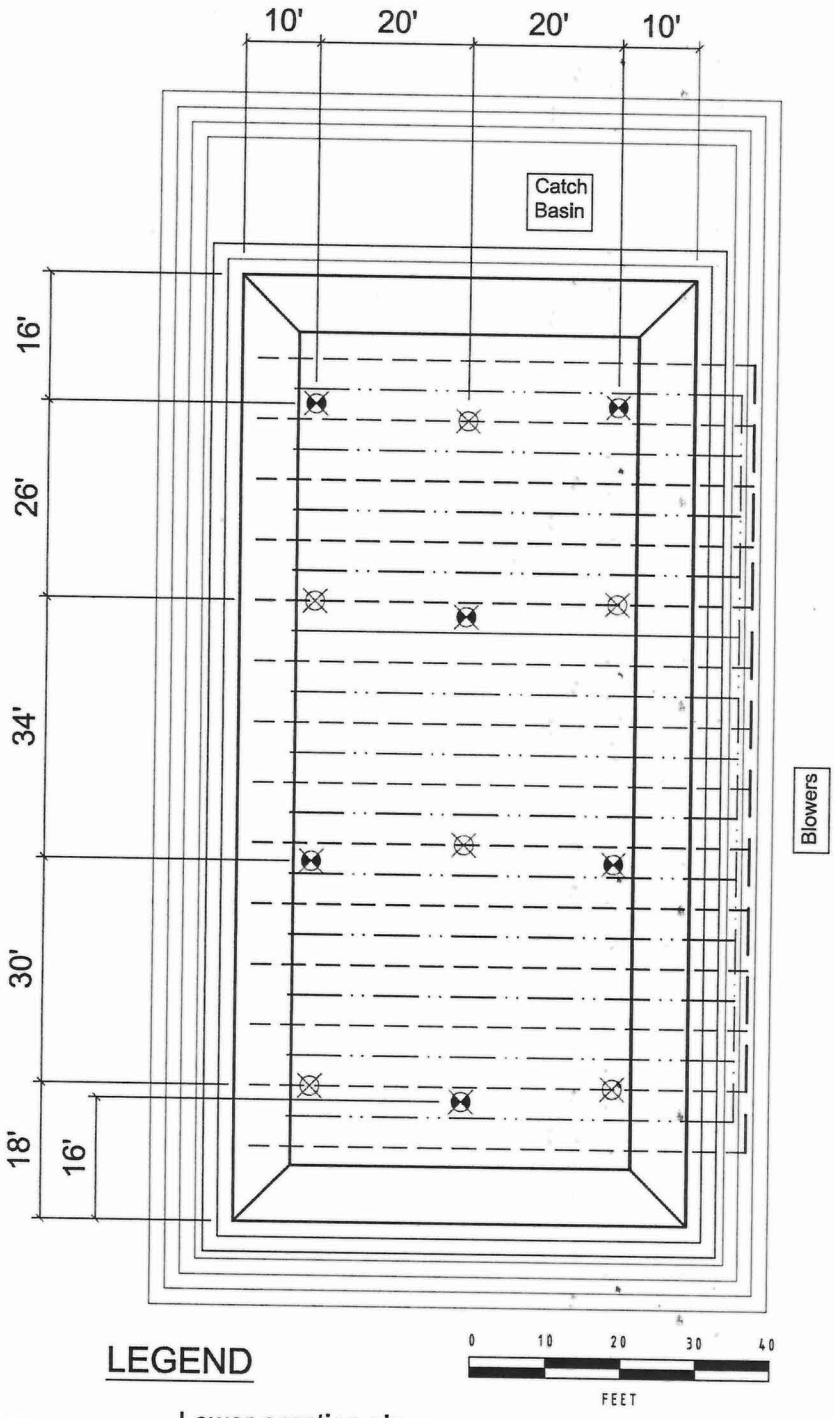


DETAIL 3 P-102
SCALE: NTS

3" SCH. 40 PVC HEADE





LEGEND

- Lower aeration pipes
- Upper aeration pipes
- Gas sample probe 4 feet below top of pile.
- Gas sample probe 7 feet below top of pile. Must be minimum 1 feet above bottom of contaminated material.

Anderson Mulholland & Associates

Approved by

Customer Representative	mm/dd/yy
Drafter	mm/dd/yy
Project Manager	mm/dd/yy
Engineering Manager	mm/dd/yy
Quality Assurance	mm/dd/yy

Rev #	date	description	by

Bristol–Myers Squibb Company

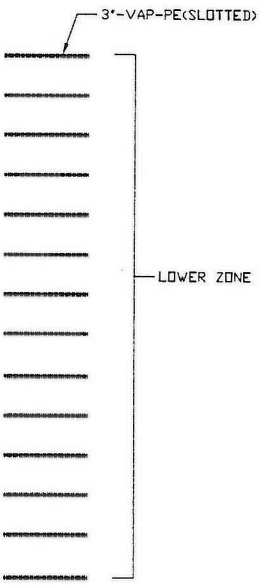
title: BIOPILE GAS SAMPLING PROBES

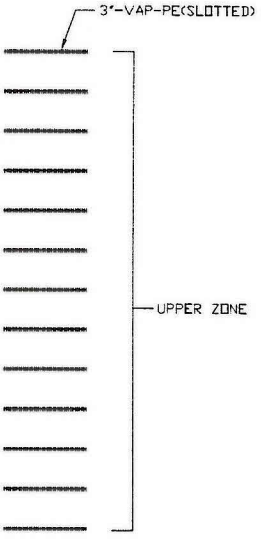
project: SOIL REMOVAL AND REMEDIATION

location:

DATE: 04/10/12	SHEET #: P-103
SCALE:	CAD FILE NAME
PRJ MGR:	
DESIGNER:	
VENDOR NAME:	
VENDOR PROJECT NUMBER:	
AUTHOR:	
DISCIPLINE:	
SYSTEM:	
SYSTEM #:	
EQUIPMENT:	

D





LEGEND:

PE	POLYETHYLENE PIPE
PVC	POLYVINYL CHLORIDE PIPE
PI	PRESSURE INDICATOR
TI	TEMPERATURE INDICATOR
	BLOWER
	BALL VALVE
	FLEXIBLE HOSE
	REDUCER
	SAMPLE TAP
	BUTTERFLY VALVE
ONE VARIABLE TWO VARIABLES	LOCALLY MOUNTED
	UPPER ZONE
	LOWER ZONE
PROCESS PIPE / PIPE DIAMETER (INCHES) / XXX-YY-Z	PROCESS PIPING IDENTIFICATION
PIPING MATERIAL IDENTIFICATION	

NOTE:

1. BLOWER SYSTEM WILL BE PROVIDED BY THE OWNER, AND WILL CONSIST OF TWO AMETEK-ROTRON, MODEL NUMBER DR-656 4-HP, SINGLE-STAGE REGENERATIVE BLOWERS, MAXIMUM 210 SCFM @ 106" OF WATER COLUMN. OWNER WILL PROVIDE THE SKID-MOUNTED BLOWERS.
2. SKID-MOUNTED BLOWERS WILL INCLUDE A CONTROL PANEL IN A NEMA 4X ENCLOSURE SUITABLE FOR 480v-3 PHASE SUPPLY EQUIPPED WITH COMBINATION TYPE MAGNETIC MOTOR, STARTER AND START/STOP PUSH BUTTONS FOR MANUAL CONTROL OF BLOWER.

Anderson Mulholland & Associates

Approved by

Customer Representative	mm/dd/yy
Drafter	mm/dd/yy
Project Manager	mm/dd/yy
Engineering Manager	mm/dd/yy
Quality Assurance	mm/dd/yy

Rev	date	description	by
A			

Bristol-Myers Squibb Company

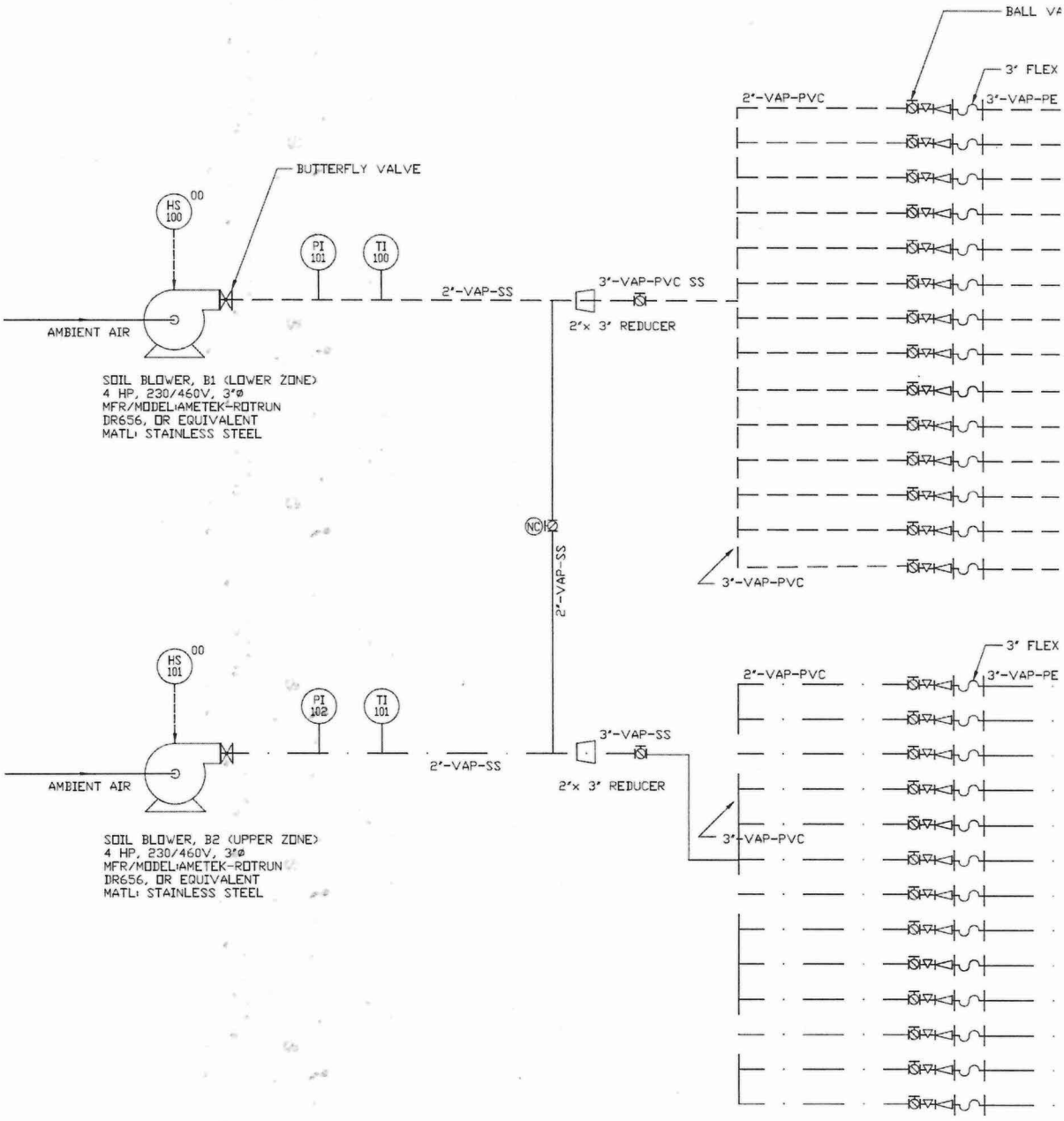
title: PROCESS AND INSTRUMENTATION DIAGRAM

project: SOIL REMOVAL AND REMEDIATION

location:

DATE: 04/10/12	SHEET #: P&ID-001
SCALE:	CAD FILE NAME
PRJ MGR:	
DESIGNER:	
VENDOR NAME:	
VENDOR PROJECT NUMBER:	
AUTHOR:	
DISCIPLINE:	
SYSTEM:	
SYSTEM #:	
EQUIPMENT:	

D


BALL VA
3" FLEX
2"-VAP-PVC
3"-VAP-PE
BUTTERFLY VALVE
HS 100
00
PI 101
TI 100
2"-VAP-SS
3"-VAP-PVC SS
AMBIENT AIR
2"x 3" REDUCER
SOIL BLOWER, B1 (LOWER ZONE)
4 HP, 230/460V, 3"ø
MFR/MODEL: AMETEK-ROTRUN
DR656, OR EQUIVALENT
MATL: STAINLESS STEEL
NC
2"-VAP-SS
3"-VAP-PVC
3" FLEX
2"-VAP-PVC
3"-VAP-PE
HS 101
00
PI 102
TI 101
2"-VAP-SS
3"-VAP-SS
AMBIENT AIR
2"x 3" REDUCER
3"-VAP-PVC
SOIL BLOWER, B2 (UPPER ZONE)
4 HP, 230/460V, 3"ø
MFR/MODEL: AMETEK-ROTRUN
DR656, OR EQUIVALENT
MATL: STAINLESS STEEL

Attachment B
Biopile Monitoring Forms

Form 1 - Biopile Air Flow Rate Monitoring Form

Bristol-Myers Squibb Manufacturing Company

Date:

Measured by:

Valve No.	Time	Initial balanced air flow (cfm)	Flow following initial balancing (cfm)	Flow following fine adjustment (cfm)	Comments
BV1					
BV2					
BV3					
BV4					
BV5					
BV6					
BV7					
BV8					
BV9					
BV10					
BV11					
BV12					
BV13					
BV14					
BV15					
BV16					
BV17					
BV18					
BV19					
BV20					
BV21					
BV22					
BV23					
BV24					
BV25					
BV26					
BV27					

Form 2 - Oxygen Concentration Balancing Form

Bristol-Myers Squibb Manufacturing Company				Date:		
				Sampled by:		
Monitoring Point ID	Time	O_2 (%)	Time	O2 (%)	Time	O_2 (%)
SG-1						
SG-2						
SG-3						
SG-4						
SG-5						
SG-6						
SG-7						
SG-8						
SG-9						
SG-10						
SG-11						
SG-12						
Comments/Observations:						

Form 3 - Soil Gas Monitoring Form

Bristol-Myers Squibb Manufacturing Company	Date:
	Sampled by:

Date and time blower switched off (if respiration test):

Monitoring Point ID	Time	O_2 (%)	CO_2 (%)	Flam. (ppmv)	H2S (%)	PID (ppmv)
SG-1						
SG-2						
SG-3						
SG-4						
SG-5						
SG-6						
SG-7						
SG-8						
SG-9						
SG-10						
SG-11						
SG-12						
Average value						

Comments/Observations:

Form 4 - Biopile Visual Inspection Form

Bristol-Myers Squibb Manufacturing Company

Date:

Time:

Inspected by:

Non Mechanical Equipment

Cover

Exposed soil	Yes / No
Rips/tears	Yes / No
Ropes/boards secure	Yes / No

if yes to any above indicate on drawing

Fence

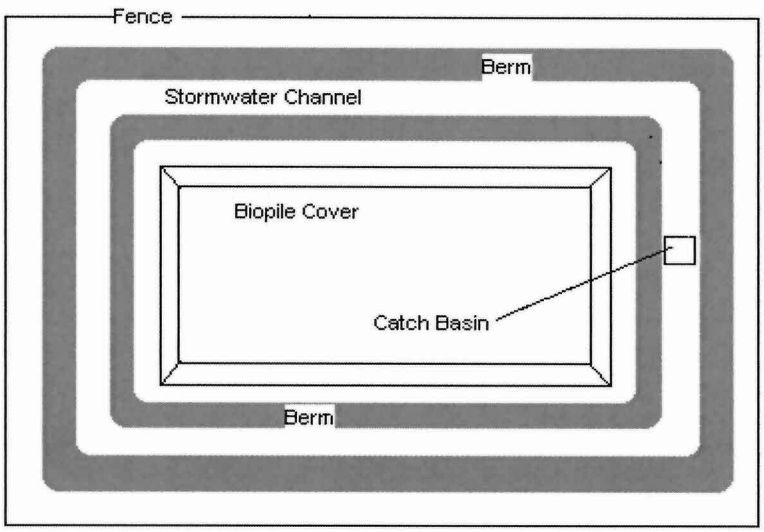
Damaged	Yes / No
Holes	Yes / No

if yes to any above indicate on drawing

Storm water channel

Blockages	Yes / No

Integrity



Non Mechanical Equipment, General Observations:

Berms

Integrity of toe

Integrity of crest

Mechanical Equipment

Blower

Valves

Gauges

Sump Pump

Appendix K

Biopile Monitoring and Inspection Forms (on CD)

Appendix L

Biopile Shutdown and Respiration Test Memorandum (on CD)

Appendix M

Hazardous Waste Disposal Log and Manifests (on CD)

Appendix N

RCRA Characteristic Analytical Results (on CD)

Appendix O

Non-Hazardous Waste Disposal Log and Manifests (on CD)

Bristol-Myers Squibb Manufacturing Company
Rt. 3, km 77.5 Humacao, Puerto Rico 00791

Interim Corrective Measure Building 5 Area

Soil Treatment Cell Closure Certification Report

April 2015 Revision

Report Prepared By:

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1.0 Background Information

1.1 General Facility Description

Bristol-Myers Squibb Manufacturing Company (BMSMC) is a facility located in the Commonwealth of Puerto Rico at State Road #3, Km 77.5 in Humacao. BMSMC is a publicly held corporation with principal offices in New York City, New York. A Site Vicinity Map is included as **Figure 1-1**.

BMSMC operates a pharmaceutical manufacturing facility which produces drugs for human consumption. The facility has been in operation since 1970. The BMSMC Plant currently consists of two active production buildings and other supporting facilities including waste treatment facilities. The site consists of approximately 48 acres.

BMSMC submitted a Temporary Unit Operations and Maintenance (TU O&M) Plan (AMAI, May 2012) which contained the operation, maintenance, and closure requirements for a soil treatment cell to be used as part of the implementation of an Interim Corrective Measure (ICM) at the "Building 5 Area" which was designated by the U.S. Environmental Protection Agency (USEPA) as Solid Waste Management Unit No. 20. The ICM is part of a RCRA Corrective Action Program being implemented at the Humacao facility in accordance with the terms of BMSMC's Final RCRA Hazardous Waste Treatment and Storage Permit No. PRD090021056 (RCRA Permit).

This report, prepared by CAR Engineering of San Juan, Puerto Rico, documents the removal and offsite disposal of "Area E" hazardous and non-hazardous soil from the treatment cell and subsequent closure of the treatment cell. CAR Engineering provided oversight and certification that all removal, disposal, and closure activities were conducted in accordance with the USEPA-approved 2012 TU O&M Plan. This report was initially submitted in September 2014, within 60-days after the closure was completed. This report has been revised based on comments sent to BMSMC in a letter from USEPA received on February 23, 2015.

1.2 Project Description

Building 5, which became operational in 1972, is the former BMSMC bulk chemical manufacturing facility. A RCRA Facility Investigation (RFI) at the Building 5 Area was completed in 1996 as part of the RCRA Corrective Action Program. During implementation of the RCRA Facility Investigation in the area, it was determined that hazardous constituents were released into the subsurface from certain underground pipes used to convey process wastewater to the former BMSMC incinerators. Investigations

completed at the Building 5 Area confirmed the presence of elevated levels of contaminants in soil and groundwater.

BMSMC implemented a phased ICM to address source area soil at the Building 5 Area. Phase 1 of the ICM, which involved excavation, treatment, and reuse or off-site disposal of approximately 1,800 cubic yards (cu yds) of impacted soil ("Area A" soil) was completed in March 2007. Phase 2 of the ICM, which involved the excavation, treatment, and off-site disposal of approximately 2,000 cu yd of impacted soil ("Area B" soil) was completed in March 2008. Phase 3 of the ICM, which involved the excavation, treatment, and off-site disposal of approximately 2,000 cu yd of impacted soil ("Area C" soil) was completed in March 2010. Phase 4 of the ICM, which involved the excavation, treatment, and off-site disposal of approximately 1,900 cu yd of impacted soil ("Area D" soil) was completed in May 2011. Phase 5 of the ICM, which involved the excavation, treatment, and off-site disposal of approximately 1,800 cu yd of impacted soil ("Area E" soil) was completed in June 2014. Ex-situ biodegradation treatment included placement of excavated soils in a soil treatment cell ("Biopile") lined with 60 mil high density polyethylene (HDPE). The Biopile was equipped with an aeration system to enhance the aerobic biodegradation of the impacted soil.

Closure requirements for the Biopile were reviewed and approved by the USEPA in a letter dated August 14, 2012 to BMSMC. The letter approved closure of the Biopile under the requirements as contained in the TU O&M Plan. CAR Engineering was contracted by BMSMC to serve as the project's Puerto Rico licensed Professional Engineer (P.E.) responsible for certifying that closure activities were performed as per regulatory requirements. CAR Engineering's role in the project was to certify that the soil treatment cell was closed in a manner that achieves closure performance standards and in accordance with the provisions of the USEPA-approved TU O&M Plan. Engineer Carlos Rivera is the registered and qualified P.E. that has inspected and verified closure activities and procedures, and is certifying that activities were properly conducted. Mr. Rivera's P.E. credentials are included in **Appendix P-1**

From March 2014 through June 2014, CAR Engineering provided oversight of the removal and management for off-site disposal of the Area E hazardous and non-hazardous treated soil contained within the Biopile, and the subsequent closure of the soil treatment cell and associated equipment. Aeration system components external to the Biopile were disconnected and disposed of and the Biopile cover system was removed and disposed with the treated soil. All treatment system components within the Biopile (i.e., perforated piping, soil gas monitors, tubing) as well as the gravel drainage layer

underlying the treated soil were loaded onto trucks and disposed at an off-site RCRA Subtitle D landfill. Transportation and disposal of non-hazardous waste generated during the closure was documented on non-hazardous waste manifests (EQB Form PGC-012) as required in *Regla 644, Inciso D (7) del Reglamento para el Manejo de los Desperdicios Sólidos No Peligrosos de la JCA.*

BMSMC contracted the services of Clean Harbors Environmental Services (Clean Harbors) and Constructora El Alba to be the contractors responsible for the removal of the soil from the treatment cell. Clean Harbors was responsible for the removal of 1,198 tons of hazardous soil and disposal at a hazardous waste disposal facility located in El Dorado, Arkansas. Constructora El Alba was responsible for the removal of 1,783 tons of non-hazardous treated soil and disposal at the El Coqui RCRA Subtitle D landfill located in Humacao, Puerto Rico. Constructora El Alba was also responsible for the removal and disposal of the Biopile's bottom plastic liner, the Biopile's concrete retaining walls, and the plastic-lined stormwater retention berms as non-hazardous waste at the El Coqui RCRA Subtitle D landfill. Additionally, BMSMC contracted the services of Anderson Mulholland & Associates, Inc. (AMAI) of White Plains, New York to collect confirmatory soil samples and to provide general consulting services related to the Building 5 Area ICM. AMAI subcontracted Accutest Laboratories (Accutest) of Dayton, New Jersey to perform the required laboratory analyses.

CAR Engineering's scope-of- work was organized into the following tasks:

- Provide periodic oversight of the dismantling of the Biopile to ensure work was performed in accordance with the provisions of the USEPA-approved TU O&M Plan
- Conduct a detailed inspection of the soil treatment cell liner for rips, tears or other conditions which may have allowed the migration of contaminants of concern (COCs) to subsurface soil.
- Provide oversight of AMAI during collection of confirmatory soil samples.
- Prepare a closure certification report summarizing the closure activities described above to certify that closure of the Biopile achieved closure performance standards set forth in the TU O&M Plan and 40 CFR 264.111.

2.0 Summary of Site Inspections

CAR Engineering conducted site inspection activities from March 26, 2014 to July 11, 2014 (Monday to Friday). Site inspections were periodically performed by CAR Engineering and the observations made during these inspections were recorded in inspection reports. Photographs of the project area were also taken. Photographic documentation taken by CAR Engineering during the site inspections are included in **Appendix P-2**. The inspection reports are included in **Appendix P-3**.

2.1 Oversight of Soil Removal

The ICM involved excavation of contaminated soil from Area E and placement of the soil in an on-site soil treatment cell ("Biopile") for treatment by ex-situ biodegradation.

CAR Engineering provided periodic oversight of the removal from the soil treatment cell of Area E soils and the subsequent Biopile closure to ensure that work was performed in accordance with the provisions of the TU O&M Plan. Project activities began on March 14, 2014 with a contractor kick-off meeting. Between March 26, 2014 and July 11, 2014 CAR Engineering conducted periodic inspections of soil removal activities. CAR Engineering's inspections included an evaluation of the cover system to ensure that Biopile soil and all components that may have contained impacted soil were properly removed from the Biopile and transported off-site for disposal.

CAR Engineering also evaluated whether the project area was properly lined and that storm water runoff controls were in place to prevent migration of impacted soil from the Biopile during removal activities. CAR Engineering observed that a high density polyethylene (HDPE) flexible membrane was placed on the ground surface across the entire project area to prevent migration of impacted soil from the Biopile during removal activities. CAR Engineering also noted the soil treatment cell was surrounded by a 12-inch high earthen berm to prevent the run-on of precipitation from adjacent areas and runoff of precipitation from the Biopile.

As indicated in **Table 2-1 and Table 2-2**, excavated materials including hazardous and non-hazardous soil as well as equipment associated with Biopile construction were disposed off-site from March 26, 2014 to July 11, 2014. BMSMC contracted Clean Harbors to remove the soil from the Biopile that did not achieve the Tier 1 treatment standard established in the TU O&M Plan. This soil was managed as hazardous waste and placed in 1-cubic yard "Flexbin" containers. Clean Harbors utilized a Volvo EC220D excavator to move soil in the treatment cell to near a Volvo BL60B backhoe

loader to load the soil directly into the Flexbins. Each Flexbin was weighed on a portable scale, and the maximum weight of soil placed in each Flexbin was limited to 1,800 pounds. The weight limitation for the Flexbin was a requirement by the disposal facility. Soil was manually added or removed to the Flexbin at the portable scale station to ensure the 1,800 pound limitation was not exceeded. The Flexbins were managed within the project area using GENIE GTH-5519 forklift. After the maximum weight was achieved for the Flexbins, the Flexbins were loaded into 40-foot long sea containers by the forklift. Due to space considerations inside the 40-foot long sea containers, a maximum of 22 Flexbins per container could be accommodated. Clean Harbors subcontracted Hernandez to transport the soil to the San Juan Port. The sea containers were then loaded onto Horizon ships and transported by sea to Port Arthur, Texas where they were unloaded from the ships, and transported by Clean Harbors' trucks to Clean Harbor's RCRA Part B Hazardous waste disposal facility located in El Dorado, Arkansas. As indicated on **Table 2-1,** Clean Harbors disposed 1,198 tons of hazardous soil at the hazardous waste disposal facility located in El Dorado, Arkansas. Copies of the hazardous waste manifests that document the transportation and disposal are provided in **Appendix P-4.** The manifests presented in Appendix P-4 identify two designated facilities for receipt of the hazardous soil: the Clean Harbors hazardous waste disposal facility located in El Dorado, Arkansas and Safety-Clean Systems, Inc. located in Maniti Puerto Rico. The Safety-Clean Systems, Inc. facility is a RCRA Part B Permitted Storage Facility that was used for the temporary storage of a portion of the hazardous waste prior to shipment to the Clean Harbors hazardous waste disposal facility located in El Dorado, Arkansas. In these instances, the transporter Hernandez transported the sea containers to the Safety-Clean Systems Inc. Facility in Maniti where they were temporarily stored until they could be transported to the San Juan Port for shipment to the Clean Harbors El Dorado hazardous waste disposal facility.

BMSMC contracted Constructora El Alba to remove the non-hazardous treated soil from the Biopile. Constructora El Alba utilized a Volvo EC220D excavator to remove the soil from the treatment cell and loaded directly into dump trucks for disposal off-site. Constructora El Alba subcontracted FS Transport Group Corporation to transport the soil in plastic lined dump trucks to the disposal facility, the El Coqui RCRA Subtitle D landfill located in Humacao, Puerto Rico. As indicated in **Table 2-2** Constructora El Alba disposed 1,783 tons of non-hazardous treated soil at the El Coqui RCRA Subtitle D landfill located in Humacao, Puerto Rico. Copies of the non-hazardous waste manifests are provided in **Appendix P-5**.

2.2 Inspection of the Soil Treatment Cell Liner

After the removal of the gravel drainage layer, CAR Engineering performed a detailed inspection of the liner to identify and document rips, tears, or other conditions that could have impacted the subsurface soil located beneath the liner. Rips and tears in the liner were identified in the field and marked. The approximate location of each tear is shown on **Figure 2-1**. Twelve liner tears were observed and reported during the liner inspection and are summarized in **Table 2-3**. CAR Engineering completed a Liner Damage Report for each tear. These reports are included in **Appendix P-3.** All liner Damage Reports were reviewed and approved by the Certification Engineer.

3.0 Summary of Soil Sampling Activities

3.1 Oversight of Soil Sample Collection

On June 14, 2014 AMAI collected confirmatory soil samples beneath the footprint of the soil treatment cell location. CAR Engineering was present during the soil sampling activities and observed AMAI personnel collect samples. As specified in the TU O&M Plan, soil samples were collected from the top 6 inches of soil immediately below the liner to determine if operation of the Biopile had impacted the underlying soil. The soil base that was placed over the liner was removed prior to collection of samples.

Soil sample locations were selected by AMAI as follows:

- Twelve confirmatory soil samples were collected beneath possible release points (i.e., tear location) identified during the liner inspection.
- The footprint of the Biopile was divided into four equal-sized quadrants. One soil sample was collected at the approximate center of each quadrant for four confirmatory soil samples.

Approximate soil sample locations are shown on **Figure 3-1**. As required by Section 4.4 of the TU O&M Plan, the samples were analyzed for the following COCs: xylene, ethylbenzene, acetone, and MIBK according to SW846 Method 8260 and methanol according to SW846 Method 8015. Accutest conducted the sample analyses. Quality Assurance/Quality Control (QA/QC) samples were also collected, including one trip blank, a matrix spike/matrix spike duplicate, an equipment blank, and a field duplicate sample.

3.2 Laboratory Analytical Results

Analytical results were validated by Rafael Infante, of San Juan Puerto Rico. The validation reports and validated laboratory data sheets are included in **Appendix P-6**. All analytical data were determined to be valid and useable. Validated analytical results for the liner samples are presented in **Table 3-1**. Applicable Tier 1 and Tier 2 treatment standards are also included in **Table 3-1**. The laboratory analytical results of the confirmatory soil samples indicated the following:

- The concentration of each COC in every sample was non-detect
- The detection limit for each COC for every sample was less than the Tier 2 treatment level

4.0 Summary of Closure Activities

Closure activities were conducted in accordance with the requirements provided in the USEPA-approved TU O&M Plan. All soil and associated equipment were removed in accordance with Section 4.3 of the TU O&M Plan.

The confirmation soil sampling results indicated the concentration of all COCs was below Tier 2 treatment standards. No additional sampling is required beneath the former soil treatment cell.

5.0 Closure Certification

I, Carlos A. Rivera Hernández, hereby certify that I am of legal age and a resident of San Juan Municipality of Puerto Rico. I am a Professional Engineer authorized to practice in Puerto Rico with license number 7937.

I am the Professional Engineer designated by Bristol-Myers Squibb Manufacturing Company ("BMSMC") in Humacao, Puerto Rico to inspect and certify the closure activities associated with the Interim Corrective Measures, Building 5 Area (Biopile Removal).

The removal activities which included sampling and documentation processes were inspected by me. I certify that the activities were conducted in full compliance with the Temporary Unit Operation and Maintenance Plan and all applicable Federal and State Laws and Regulations. The closure achieved closure performance standards as set for by 40 CFR 264.111; as such, the specifications of the USEPA-approved Temporary Unit Operation and Maintenance Plan, Building 5 Area (Revision 1.0), Bristol-Myers Squibb Manufacturing Company, Humacao, Puerto Rico dated July 2014 are completed at this time.

6.0 References

AMAI, 2012. Anderson, Mulholland & Associates, Inc. Temporary Unit Operations and Maintenance Plan, Bristol-Myers Squibb Manufacturing Company, Humacao, Puerto Rico, May 2012.

Appendix P-1

Professional Engineer Documentation

Renovado
19/Aug/2013

Estado Libre Asociado de Puerto Rico
Commonwealth of Puerto Rico
DEPARTAMENTO DE ESTADO
Department of State
Secretaría Auxiliar de Juntas Examinadoras
Office of the Assistant Secretary of State for Examining Boards

La Junta Examinadora de Ingenieros y Agrimensores
The Examining Board of Engineers and Surveyors

por la presente certifica que
hereby certifies that

Carlos A Rivera Hernández

por haber cumplido todos los requisitos de Ley, ha sido inscrito
en el Registro de esta Junta como
having met all the requirements of law, has been registered as:

Ingeniero Licenciado, RPA
Licensed Engineer, SPR

En testimonio del cual se expide esta licencia para el ejercicio de dicha profesión bajo el sello de la Junta.
In testimony whereof, this license is issued to practice as a professional, under the seal of the Board of Examiners.

En San Juan , Puerto Rico, efectivo el 31 de julio de 2013.
In San Juan , Puerto Rico, effective on July 31, 2013.

Licencia Número: **7937**
Certificate Number:

Vencimiento: **30 de julio de 2018**
Expires: *July 30, 2018*

JUNTA EXAMINADORA DE INGENIEROS Y AGRIMENSORES
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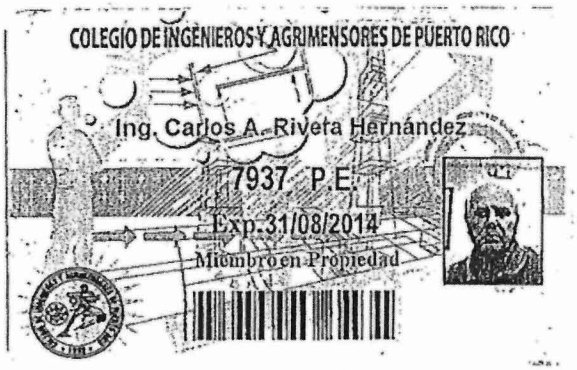
COLEGIO DE INGENIEROS Y AGRIMENSORES DE PUERTO RICO
Ing. Carlos A. Riveta Hernández
7937 P.E.
Exp. 31/08/2014
Miembro en Propiedad

Appendix P-2

Photographic Log

Photographic Log

Property Name: Bristol-Myers Squibb	Location: BIOPILE

Date: March 21, 2013	Photo Number: 1

Comments:

Newly constructed Biopile. Photograph taken from the roof of Building 5 looking toward the west.

Photographic Log

Property Name: Bristol-Myers Squibb	Location: BIOPILE

Date: May 17, 2013	Photo Number: **2**

Comments:

Biopile aeration piping, storm water collection berm, and Biopile top cover. Photograph taken from northwest side of the Biopile looking toward the east.

Photographic Log

Property Name: Bristol-Myers Squibb	Location: BIOPILE

Date: May 17, 2013	Photo Number: **3**

Comments:

Biopile storm water collection berm and Biopile top cover on south side.
Photograph taken from southwest corner of Biopile looking toward the east.

Photographic Log

Property Name: Bristol-Myers Squibb	Location: BIOPILE

Date: April 1, 2014	Photo Number: 4

Comments:

Removal of hazardous soil. Hazardous soil was loaded into lined Flexible Intermediate Bulk Containers (FIBCs). Photograph taken from the north side of the Biopile Project area looking toward the southeast corner of the Biopile.

Photographic Log

Property Name: Bristol-Myers Squibb	Location: BIOPILE

Date: May 7, 2014	Photo Number: 5

Comments:

Removal of hazardous soil. Hazardous soil was loaded into lined FIBCs. Photograph taken from north side of the Biopile Project Area looking toward the south side of the Biopile.

Photographic Log

Property Name: Bristol-Myers Squibb	Location: BIOPILE

Date: April 24, 2014	Photo Number: **6**

Comments:

Excavator bucket screening of soil within Biopile. Each bucket of soil removed by the excavator was field screened for total VOCs using a field-calibrated PID meter. Photograph taken from the north side of the Biopile looking toward the south.

Photographic Log

Property Name: Bristol-Myers Squibb	Location: BIOPILE

Date: April 29, 2014	Photo Number: 7

Comments:

Biopile hazardous soil removal. Hazardous soil was loaded into lined FIBCs by the backhoe and the FIBCs were managed within the Biopile Project Area using a GENIE GTH-5519 forklift. Photograph taken from the north side of the Biopile Project Area looking toward the southeast corner of the Biopile.

Photographic Log

Property Name: Bristol-Myers Squibb	Location: BIOPILE

Date: May 16, 2014	Photo Number: 8

Comments:

Filled FIBC readied for transport in 40-foot long sea containers shown in the background. Photograph taken from west side of the Biopile Project Area looking east.

Photographic Log

Property Name: Bristol-Myers Squibb	Location: BIOPILE

Date: June 10, 2014	Photo Number: **9**

Comments:

Treated soil removal from Biopile by the excavator and loaded into a dump truck for off-site disposal at Waste Management's Humcao Landfill. Photograph taken from the southeast corner of the Biopile looking toward the northwest.

Photographic Log

Property Name: Bristol-Myers Squibb	Location: BIOPILE

Date: June 13, 2014	Photo Number: **10**

Comments:

Biopile project area after the removal of the treated soil. Liner was hand swept. Photograph taken from the northeast corner of the Biopile looking toward the southwest.

Photographic Log

Property Name: Bristol-Myers Squibb	Location: BIOPILE

Date: June 17, 2014	Photo Number: **11**

Comments:

Rip in Biopile bottom liner. Bottom liner was inspected for rips and tears. Rips and tears were marked and the soil under the rip or tear was sampled. Photograph taken from inside the north side of Biopile looking toward the north interior wall of the Biopile.

Photographic Log

Property Name: Bristol-Myers Squibb	Location: BIOPILE

Date: July 14, 2014	Photo Number: **12**

Comments:

Final load of Biopile debris waste in a dump truck. Closure was completed when the last load of Biopile debris was removed for off-site disposal at Waste Management's Humacao Landfill on July 14, 2014. Photograph taken from a step ladder located inside the Biopile Project Area looking toward the east.

Photographic Log

Property Name: Bristol-Myers Squibb	Location: BIOPILE

Date: July 14, 2014	Photo Number: **13**

Comments:

Biopile Project Area after the final load of Biopile debris waste was removed for off-site disposal at Waste Management's Humacao Landfill on July 14, 2014. Photograph taken from the northeast corner of the former Biopile area looking toward the southwest.